

# ADDRESS IN SURGERY.

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Delivered at the Semi-Centennial Meeting of the American Medical Association at Philadelphia, Pa., June 3, 1897.

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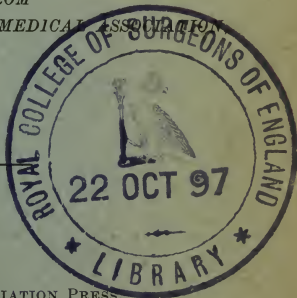
BY W. W. KEEN, M.D., LL.D.

PROFESSOR OF THE PRINCIPLES OF SURGERY AND OF CLINICAL SURGERY,  
JEFFERSON MEDICAL COLLEGE, PHILADELPHIA, PA.

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REPRINTED FROM  
THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION  
JUNE 12, 1897.

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CHICAGO:  
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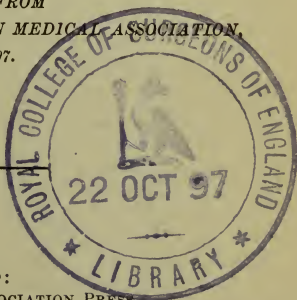
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*Mr. President and Gentlemen of the American Medical Association:*—It is always proper to acknowledge an honor, but when it comes unsolicited from so large and distinguished a body of men, representative of the entire profession in the United States, and on an exceptional occasion, I feel it a double honor to have been chosen to deliver the semi-centennial address in surgery. I beg to return you my very hearty thanks for your extreme kindness.

As we celebrate on this occasion the semi-centennial of the organization of the AMERICAN MEDICAL ASSOCIATION, in this city, in 1847, it is very natural and proper, that the Address in Surgery should be a review of the work done in the last fifty years, and by contrasting the state of surgery and of surgical teaching in 1847 with that which exists in 1897, to see what progress has been made. To recount what has been achieved in these "fifty years of science" far better than a "cycle of Cathay" is not only a pleasure, but it is an immense incentive, since by the progress made in the last fifty years we can in some measure anticipate the enormous, and probably even still greater progress, that will be made in the next half century.

The time, also, is opportune. Last year was celebrated the centennial of vaccination and the semi-centennial of the first public administration of ether. Sydney Smith's bitter query in 1820, "In the four quarters of the globe, who reads an American book, what does the world yet owe to American physicians or surgeons?" was answered a quarter of a century later and made all these "four quarters of the globe," our grateful and everlasting

debtors for the gift of anesthesia. The discovery of an American dentist; first used by an American surgeon; christened by an American physician and litterateur; the recent celebration awakened throughout the world the interest not only of the profession, but also of the entire public; and the strains of our still living poet, novelist, physiologist and, as we all best love to remember him, neurologist, Dr. S. Weir Mitchell—*nihil tetigit quod non ornavit*—as he sung of the “Birth and Death of Pain,” have scarce died away before we begin anew our round of celebrations in the anniversary of this now almost venerable ASSOCIATION.

A most important factor in the improvement not only in surgery but also in all departments of medicine, has been the immense advance made in medical teaching. The educational plane of the profession has been steadily elevated. If the teachers of fifty years ago were to revisit the scenes of their early labors they would scarcely recognize the medical colleges, in which, in their day and generation, and with the meagre appliances then at their command, they did what we must still recognize as yeoman’s work in education. Apparently, at that time, the entire instruction consisted in lectures, no text-books even being advised. In reply to a letter addressed to the deans of the Jefferson Medical College and of the Medical Departments of the University of Pennsylvania, Harvard University and Columbia University, I am told that no lists of text-books whatever appear on the catalogues of fifty years ago. In the “catalogue” of the Jefferson, for 1857—a mere catalogue of names of the faculty and students, instead of the present elaborate “Announcement”—for the first time appears a list of “Books of Reference,” and the Dean of Harvard, states that there, “the first mention whatever made of text-books appears in the announcement of the summer session, beginning March 12, 1866,” four years after I graduated! At first the text-books generally recommended on surgery were Drewitt and Erichsen;

Malgaigne and *Pancoast*,<sup>1</sup> on "Operative Surgery," and, for collateral reading, Bordie and Holmes.

The course of didactic lectures then began on the second Monday of October and ended soon after the middle of February, and if we take out the holidays, and remember that not a few made up for coming late by leaving early, it was quite a possibility for a man to receive his authorization to practice, a diploma which alleged him to be "*Virum probum in arte medica, aeque ac chirurgica . . . dignum amplissimis honoribus academicis*," after practically only two sessions of three months each! The examination was a farce and the diploma a falsehood. Even so late as 1860, when I began the study of medicine, there were no laboratories, except that of anatomy—the dissecting room. I doubt whether of the two hundred and odd men who graduated with me in 1862, 10 per cent. had ever looked through a microscope or handled a test-tube, palpated a tumor or auscultated a chest. There were no recitations; neither were there ward classes nor other means for actual contact of the student with disease. We can but wonder that any of us who graduated in the first twenty years of the half century we are celebrating ever learned enough to prevent some from being rivals to Saul, who had slain his thousands, and the more nimble from rivalling David, who slew his ten thousands. That we have become respectable practitioners, or possibly more than respectable, is due not so much to our early opportunities as to later incessant midnight labors.

Now we may congratulate ourselves that the majority of the Medical Schools of the country have a graded course of four years, each covering not less than six, and often eight months; not only lectures, but in many instances constant and searching recitations; almost a score of laboratories in which each student actually does the work of observation and

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<sup>1</sup> The names of American surgeons are printed in italics, to point out more distinctly some of those Americans who have aided in the development of surgery. The limits of the address only allowed me to name a few, and I must apologize for all the necessary omissions.



experiment; ward classes in which every man is obliged to train his eyes, his ears, his fingers and his judgment, in the examination of patients in every department of medicine; to ferret out the history of the cases brought before him, ascertain symptoms, seek for physical signs, reach a diagnosis, determine the treatment, and often actually to prescribe and to assist at operations.

Not only, however, is the advance marked in our medical schools, whose diploma now really means, almost what it says, but also all over the land since 1847 there have been established, partly from philanthropic motives and partly for the purpose of medical teaching, an enormous number of hospitals, in which a very large proportion of the young men, after receiving their diplomas, spend a year or more in the actual practice of their profession, under the eye of accomplished teachers. It is impossible to describe the immense benefit thus obtained by large numbers of nascent practitioners, from such familiarity with all the phases of disease which they will meet in their after lives. Not a few of them also, by being brought in contact with energetic, enthusiastic, and wise teachers, receive their first stimulus, both literary and scientific, a stimulus which will influence their entire future course, and is of far more value than any amount of mere scientific knowledge they may acquire.

What untold good these hospitals do, not only to the patients who are cured and the internes who are taught, but equally to the older medical staff who are still further trained and educated by them! Not only in great metropolitan centers, but in small towns, and sometimes even in rural communities, this growth of hospitals has been within the last twenty years one of the striking features of our civilization. It is not too much to say, that every city or town establishing a hospital, is repaid a hundred fold in the immediate improvement of its medical men, from these opportunities for experience and exact study. No one can



visit a modern hospital without being struck by the immense improvements of the last few years. The noisome hotbeds of contagion, of fever, of suppuration, of erysipelas, of blood poisoning and of "hospital" gangrene—could irony wield a sharper weapon than such a name?—have given way to neat and trim wards the home of cleanliness itself with iron bedsteads, glass topped tables, cement or marble, tiled or tessellated floors and walls, with trained nurses whose jaunty caps and pretty uniforms and often winsome faces almost make one half wish to be sick, and when one is sick half loth to be well.

I mentioned a moment ago the text-books in use forty years ago. Except *Pancoast's* "Operative Surgery," every one of them it will be observed was the work of a European. *Gross's* "System of Surgery," which has probably had a wider influence in educating the profession than any other general surgical text-book issued up to the present time—a monument of surgical knowledge and indefatigable labor—was first published in 1859. This was far in advance of most of the surgical text-books then in use. The literary labors of American surgeons consisted chiefly in translating foreign surgeries, or in annotating American editions of English text-books.

Within the last two decades, and especially the last, we all know, without my undertaking the invidious task of naming them, how many distinctly American surgeries have been written, and we may say without undue national vanity that they are the equals of any similar European works. This literary and scientific activity, however, has not been limited to text-books or systems of surgery alone, but our forward strides in education have been marked by the appearance of not a few monographs of original research which do credit not only to their authors but to all American surgeons.

On more than one occasion I have had to call attention to the difference between American surgery and that of Europe. While in the department of the prac-

tice of surgery, after a full acquaintance and observation with European men and methods, I can state my deliberate conclusion that the best American surgeons are the peers of the best European surgeons; yet in the department of original research and especially of laboratory work, we must confess our very evident shortcomings. I do not say that we should be ashamed of them, for we must remember that we are but little more than a century old as a nation; that the practical needs of everyday life must first be met; that opportunities must be created by the construction and endowment of laboratories, and especially by the growth of that literary and scientific spirit which only develops in any community or profession in the course of long years and with accumulated wealth, and which has had little opportunity for growth in this country until within the last twenty years. The genius of our institutions is such that we can never look for government or State endowments of such laboratories, but must depend on the far sighted and broad minded liberality of our wealthy fellow-citizens for the establishment of such laboratories and the consequent opportunities for investigation and discovery. Nor do I believe in the long run we shall suffer by reason of this difference. As a people we are not apt to be left behind in the race, and the stimulus of a somewhat exceptional distinction in science or literature will meet with a responsive chord in the breast of many a young man now beginning his studies.

To attempt to impress upon the members of the AMERICAN MEDICAL ASSOCIATION the need for such original research in this country is a work of supererogation, but I may with propriety urge you with all the ardent and intense conviction I feel, that as we leave this festal meeting and go to our homes, every one of us as occasion offers will urge upon our wealthy liberal-minded fellow-citizens the duty and also the privilege of founding in connection with every medical school laboratories of research, the good influence and beneficent results of which can never be estimated

in paltry dollars and cents. Yet tried even by this commercial standard science pays. The early recognition of the germs of cholera at the port of New York some years ago by preventing the entrance of such a commerce-destroying epidemic, leaving wholly out of consideration the saving of human life, saved to the citizens of the metropolis more millions of dollars than are represented many times over by the cost of all the laboratories now existing in this country. Our merchants should be made to understand, therefore, that even from a financial point of view, to say nothing of the humanitarian standpoint, the cheapest means of preventing the enormous business losses which occur from epidemics is by such scientific and hygienic measures as the laboratory makes possible.

Allied to medical teaching and the most important adjunct to medical literature is the establishment of extensive medical libraries. In this, as an American, I am proud of my own country. No foreign nation can point with equal pride to any such medical libraries as the last thirty years have developed in this country. Foremost, not only among American libraries, but in the world, is that of the Surgeon-General's Office of the United States Army in Washington. Not only has it gathered thousands of medical books and eleven hundred medical journals (the estimate of Dr. Fletcher) from all over the world, but the entire library is managed with a liberality which makes it the admiration and the envy of foreigners. Its treasures are freely at the service of the entire profession of the country, and the publication (under the editorship of *Dr. John S. Billings*) of its magnificent "Index Catalogue," has made the whole world debtors to America. We trust that a more liberal congress may see that if even the small amounts thus far given to it have made it of such immense value, still larger and more generous appropriations would keep it ever in the van.

In addition to this, the libraries of the College of

Physicians of Philadelphia, of the New York Academy of Medicine, and of the Boston Medical Library Association are only surpassed by those of the faculties of medicine in Paris, of the Royal College of Surgeons of London, and of the Military Medical Institute of St. Petersburg; while those of the Newberry Library in Chicago (thanks to our honored and liberal president), of the New York Hospital, and of the Pennsylvania Hospital rank well with the best European libraries. With such literary opportunities, therefore, if we had equally good scientific laboratories the possibilities of American medicine and surgery would be almost unbounded.

The scientific progress of this half-century of surgery has separated us from the past as by a great gulf. Great theologians, such as a Calvin or a Jonathan Edwards, were they recalled to life, could discourse as learnedly as ever of Predestination and Free Will; great preachers, as a Beecher or a Spurgeon, could stir our souls and warm our hearts as of old; great jurists, as a Justinian or a Marshall, could expound the same principles of law which hold good for all time; great forensic orators, as a Burke or a Webster, could convince us by the same arguments and arouse us by the same invectives or the same eloquence that made our fathers willing captives to their silver tongues. But today, so rapid has been our surgical progress, a Velpeau, a Sir William Ferguson, or a *Pancoast*, all of whom have died within the last thirty years, could *not* teach modern surgical principles nor perform a modern surgical operation. Even our every-day surgical vocabulary—staphylococcus, streptococcus, infection, immunity, antisepsis and asepsis, toxin and antitoxin—would be unintelligible jargon to him; and our modern operations on the brain, the chest, the abdomen and the pelvis would make him wonder whether we had not lost our senses, until seeing the almost uniform and almost painless recoveries, he would thank God for the magnificent progress of the last half-century, which had vouchsafed such



magical, nay such almost divine power to the modern surgeon.

The splendid Index Catalogue of the library of the Surgeon-General's office teaches another lesson. In law, the jurist or attorney deals with statutes and precedents, and to some extent with principles which are for the most part local. An American lawyer could not plead a case in Germany, nor a German lawyer in Russia, nor a Russian lawyer in Italy. Laws and customs differ from country to country. An American or an English divine would be an alien in language and religion in Hindostan; a Hindoo, equally an alien in China; a Chinaman, in Africa. But surgery is one and the same the world over. Whether in the frozen north or under the equator, in civilized America or barbaric Africa, be the patient white Caucasian, swarthy Negro, red Indian or yellow Malay, the same accidents and diseases assail him, the same remedies save him, identical operations cure him: a new remedy discovered in Japan is equally efficacious in Philadelphia; a new operation devised in America is equally applicable in Egypt. The Index Catalogue, which is a catalogue not for one country, but for all nations and all tongues, contains them all. This, with our noble stand as a profession against patenting any instrument, any operation or any method of treatment, makes every sick or injured man my brother, and makes me his keeper, under every sky, and clothed in any skin. Heaven bless such a divine profession, such a noble array of generous men battling for the life and health of all mankind, the world over, in one serried phalanx of unselfish heroes!

The development of modern surgery, apart from surgical teaching, libraries and laboratories, is dependent on several noteworthy factors. These have to do partly with the discovery and development of surgical principles, and partly with the development of surgical practice. Now the one and now the other is in advance. Each is the handmaid of the other. In Listerism we see surgical practice outstripping sur-

gical principles, for of Lister it might truly be said, that by the "scientific use of the imagination" he saw the germs, "when as yet there were none of them." His surgical insight convinced him of the existence of the germs of suppuration years before Ogston's and Rosenbaum's discovery of the pyogenic organisms. On the other hand, the moment that the scientist discovered these germs, the laboratory enabled him to discover many others, and the discovery of the bacillus of tetanus, of the tubercle bacillus, of the streptococcus of erysipelas, of the gonococcus, of the bacillus of malignant edema, the bacillus mallei, etc., illustrate the converse—science forging ahead of practice, and pointing the way to new achievements in the healing art.

Foremost among the important studies which the past fifty years have seen established on a firm foundation, is that of *Pathology and Pathological Anatomy*. It is not a little credit to America that the first pathology written in the English language was written by a young American doctor, in a then small western town, as early as 1839. In spite of Gross's book, however, pathology and pathological anatomy were almost unknown sciences in 1847. The Pathological Society of Dublin was founded in 1839, that of New York in 1844, that of London in 1846 and that of Philadelphia in 1857. The microscope, and especially microscopical methods of staining, section cutting and the like were in their infancy, or may indeed be said scarcely to have existed. No accurate views of pathology could be entertained without these aids. What is now the heritage of every first year student was beyond the possibilities of the most advanced teacher of fifty years ago.

Second. — *Allied sciences* have been put under tribute to surgery. In physics the discovery of the *Roentgen rays* is so recent as to require only mention. This discovery, as well as the enormous advances of *Electricity*, as seen in the electric head-light, the cystoscope, the gastrodiaphanoscope, and other means of



diagnosis, engenders the hope that other forces and other means of investigation quite as surprising and quite as marvelous, are certainly to be expected within the next fifty years.

It is due, however, especially to the development of *Embryology* and *Comparative Anatomy*, in combination with pathology, that our views of the nature of disease have become so much more accurate. Perhaps the book which influenced surgical views and surgical practice more than any other, was Chelius's "Surgery," of which a translation by South was republished in Philadelphia in 1847. It had passed through six editions, and had appeared in eight languages. It may be taken, therefore, as the type of the most advanced continental surgery of that day. How curiously vague his ideas of pathology were, may be seen in his classifying together false joints, old rupture of the female perineum, harelip and cleft palate, as "old" in contradistinction to "recent," "solutions of continuity which do not suppurate." Though he speaks of the last two as "original vices," yet so far as concerned embryology, which has shown the cause for hare-lip and cleft palate, he is absolutely silent. Stenosis of the esophagus, of the rectum, of the prepuce, urethra and vagina, were all classed together under "diseases of unnatural adhesions of parts." The existence of neoplasms as a cause of the stenosis, was not clearly differentiated from other causes. All his ideas as to tumors were vague, and, as we now know, wholly unscientific. There is no chapter on tumors in the modern sense, though there is one on "diseases which consist in the degeneration of organic parts, or in the production of new structures;" but even in this, enlarged clitoris, goitre, warts, bunions, fungus of the dura mater, fatty swellings, encysted swellings and loose bodies in the joints are grouped with polyps, sarcoma, cancer, and other new growths. Ranula, retention of urine, and retention of the fetus are classed together as "Foreign Bodies formed in our organism by the retention of natural products," and

hernia cerebri is treated in connection with all other forms of hernia. Greater disregard of their pathology or etiology, of their origin and significance, can hardly be imagined.

Though John Hunter had dissected over five hundred varieties of animals a half century before the AMERICAN MEDICAL ASSOCIATION was organized, yet the solidarity of the animal kingdom from man down to the lowest form of life was not recognized. Evolution and, therefore, reversion to animal types, was not recognized, and hence not used to explain many abnormal developments. For instance, abnormalities in the arch of the aorta and its branches, which we now recognize as variations of a general plan running through the entire animal kingdom, were then mere curiosities of structure without any meaning.

Third.—The year before the AMERICAN MEDICAL ASSOCIATION was organized the world was startled and surgery revolutionized by the introduction of *Anesthesia*; first of ether, in America, in the year 1846; and of chloroform, in Edinburgh, in the following year. What this has done for the amelioration of the horrors of pre-anesthetic surgery, very few now living can appreciate. Instead of shrieks, and cries, and groans, and a needful celerity which sometimes became dangerous haste, everything now proceeds with that quiet and leisure which is essential to the performance of many, if not most, of our modern, elaborate and prolonged surgical operations. Now "the fierce extremity of suffering has been steeped in the waters of oblivion, and the deepest furrow in the knotted brow of agony has been smoothed away forever." (Holmes.) Who could possibly endure the tortures of an operation lasting for one, two, or it may be even three hours, when every minute seemed an eternity of agony? I would rather be the discoverer of anesthesia than have won an Austerlitz or a Waterloo.

The old motto, "*tuto cito et jucunde*," is now changed by the omission of "*cito*." In fact, as has been pointed out by Cheever and a few others, the leisurely per-

formance of operations which is made possible by ether is in danger of leading us to a dilatory method of operating which has its own dangers. Some of our most successful modern surgeons owe not a little of their lessened mortality, I am sure, to their swiftness.

The ideal anesthetic has not yet been obtained. No one who reads the journals from week to week, and sees the sad headings "Death from Anesthetics," and especially "Death from Chloroform," can fail to see that both ether and chloroform, and also a few others which occasionally replace them, have very real dangers. The ideal anesthetic will not be one which will abolish pain without abolishing consciousness. To have the patient aware of surgical emergencies which test even a veteran operator's skill and resources to the utmost, would frequently invite death by the terror which it might occasion. The ideal anesthetic will abolish pain by the abolition of consciousness, *but without danger to life*. That it will be found, is as certain, as that experiment and progress are our watchwords.

Besides general anesthesia, several forms of local anesthesia have been devised, within the last few years, by freezing with salt and ice, rhigolin or chlorid of ethyl, by cocaïn, eucaïn, Schleich's infiltration method, etc., methods which have a distinct sphere of usefulness, especially in minor operations.

Fourth. *Antiseptic surgery*.—While the exact date of the revolution in surgery due to anesthesia can be fixed, a later revolution in our surgical methods came in so gradually that one can not name any special day, or even year, when it was introduced. But, while the day or year can not be given, the one man to whom this great revolution in modern surgery is due is well known. The name of Lister, *primus inter pares*, is honored throughout the entire surgical world, and his recent distinction, as the first medical peer of the United Kingdom, is an honor conferred not upon Lord Lister alone, but upon the entire Profession, and worth-

ily marks a new departure in the recognition of medical science by the queen.

So far as this country is concerned, the introduction of antiseptic surgery may be said to date from the visit of Mr. Lister to this same city of Brotherly Love, at the Centennial International Congress of 1876. Derided at first as a "fad" or as "nothing more than surgical cleanliness," it has now won its way over the whole world. A few laggards in the surgical army there are who even yet do not practice modern antiseptic or aseptic surgery, but the overwhelming majority of the profession recognize that the world owes a debt to Lord Lister, which no honors can pay. His service to humanity will never be forgotten, and probably never will be surpassed, in its wide-reaching beneficent influence. Anesthesia abolished pain; antiseptics has almost abolished suppuration, erysipelas, tetanus and the various forms of blood poisoning; in other words, nine-tenths of the dangers of surgical operations. Malgaigne, from 1836 to 1840, lost 126 amputations of the thigh, out of 201, a mortality of nearly 63 per cent. (Mütter's Liston, p 425). *Erdman* (*Annals of Surgery*, xxii, 1895, p. 358) has shown, that in nine New York hospitals, from 1882 to 1894, the mortality in 223 amputations of the thigh was 21.5 per cent. Heimann (*Arch. klin. Chir.*, 1897, liv, 223) reports in Germany, in 1894, 475 cases with a mortality of 21.7 per cent. Page (*Lancet*, 1894, i, 1439) of Newcastle-upon-Tyne has shown that, from 1876 to 1893, of 230 amputations of the thigh, the mortality was only 11.3 per cent., and *Estes* (*N. Y. Med. Rec.*, Nov. 3, 1894) of 77 such amputations lost only 8, a mortality of but 10.4 per cent. Not a little of this lessened mortality is due to our improved methods of hemostasis especially by the use of the hemostatic forceps, and at the shoulder and hip joints by the use of Wyeth's pins.

Without anesthesia and antiseptics, modern surgery would be an impossibility. It is to me an inspiring and encouraging thought that the world owes the three

greatest discoveries of modern medicine—Vaccination, Anesthesia and Antisepsis—to England and America. Long may they be joined in such scientific brotherhood! Never may they be sundered by fratricidal strife!

Fifth.—As an outgrowth from the practical development of antiseptic surgery has arisen a wholly new science, and a wholly new method of practice, which bid fair to revolutionize our modern therapeutics—*Bacteriology and Orrhothrapy*. Like the antiseptic method, they have been a gradual outgrowth. Modern laboratory research has verified the crude suspicions and shrewd guesses of thirty years ago, and transformed them into the certainties of modern science. The discovery of the anthrax bacillus by Pollender, in 1855; the epoch-making discovery of the pyogenic organisms, in 1881, by Ogston and Rosenbaum; of the tubercle bacillus by Koch, in 1882; of the tetanus bacillus by Nicolaier, in 1887, will illustrate how recent is this scientific knowledge. The splendid results which have been achieved in medicine, by the use of Behring's and Roux's diphtheritic antitoxin, seem to promise that some form of anti-streptococcic serum will do as much for surgery, and that your orator fifty years from now will be able to trace the history of the probably soon to be realized method of battling with infection, of which at present we have only a premonition. Bacteriology and orrhothrapy are so recent that it is dangerous to prophesy what may occur, but it is not venturing far to predict that fifty years from now we shall be able not only to easily convert infected into non-infected wounds, but also, by some means as yet undiscovered, we shall be able successfully to combat the infection, and prevent the dire ravages of tuberculosis, of syphilis, of cancer, of sarcoma, and possibly even the occurrence of benign tumors. That will be indeed the surgical "Golden Age," when surgery will be robbed of nearly all its terrors, when a peaceful victory will abolish our present instruments and the majority of our present operations.



Sixth.—*Animal experimentation* has had also a very large share in the development of modern surgery. The whole question of the introduction of animal ligatures was begun in America by *Physick*, who used buckskin; his follower, *Dorsey*, who used kid, and cut both ends short; *Hartshorne*, who used parchment, and *Bellenger* and *Eve*, the tendon of the deer; and this has been solved principally by experiments upon animals, in order to determine accurately the behavior of such ligatures in the tissues. Only professional readers can appreciate what a boon to humanity this single achievement has been. Modern cerebral surgery also owes its exactness and success almost wholly to cerebral localization and antisepsis, both of which were first studied by experiment upon animals, and later by the application of the knowledge so gained to man. *Bacteriology would not now exist as a science, nor would accurate modern surgery and a large part of modern medicine be possible, had experiments upon animals been prohibited, as some zoöphilous men and women who love dogs better than men and women, and even little children, desire.*

Seventh.—The developments of modern surgery has naturally been on two lines: First. That of *scientific* progress based especially on pathology, bacteriology, embryology and comparative anatomy. Our present views of tumors, of malformations, of the theory of immunity, of septicemia and pyemia, of thrombosis and embolism, have been the result of the studies by physiologists and pathologists, which have most profoundly helped our practice and influenced our results. Secondly. Within the last twenty-five years, especially, there has come what might be called preëminently the era of the *operative surgeon*, due more especially to the introduction of anesthesia and later of antisepsis. By making it possible to perform an operation without pain, and almost without danger, organ after organ of the body has been made accessible to the modern surgeon with almost invariable success. Scarcely twenty years ago even *Erichsen*, in a public



address, declared that surgery had nearly reached its final limits, and that the brain, the heart and the lungs must ever remain inaccessible to the surgeon's knife! But now these organs are so constantly operated on and even removed that I have about reached the conclusion that, with the exception perhaps of the heart, all of our internal organs are strictly to be classed as luxuries—and we even know some heartless people. From this safety and painlessness there has been born an audacity unknown to the men of a former generation. Diseases then thought to be incurable are now vanquished every day in our clinics, and organs thought to be inaccessible are attacked with an impunity which is perfectly marvelous. Indeed, the danger is not slight, that we may go to the other extreme and we may well heed the warning of *Weir Mitchell*, that, perhaps, "surgery has lost much of that keen sense of responsibility which grew out of the larger mortality of other days."

Modern instruments of precision, such as the clinical thermometer, the cystoscope, the ophthalmoscope, the laryngoscope, the otoscope, the proctoscope, the aspirator, etc., without which accurate diagnosis and proper treatment are often impossible; instruments accessory to operation, such as retractors, hemostatic forceps, transfusion apparatus, etc., without which the modern surgeon would be hampered and hindered beyond measure, were wholly unknown thirty years ago.

Time will not permit me to trace chronologically the introduction of one operation after another. We can best, perhaps, obtain a notion of the difference between the surgery of 1847 and that of 1897, by noting what operations were performed at the former date and contrasting them with present possibilities. Among the operations performed a half century ago may be included—

Amputations;

The ligation of the most important arteries;

Occasionally excision of joints;

The removal of tumors;

Lithotomy;

Lithotrity;

Colostomy;

Herniotomy;

Tracheotomy;

Tenotomy (the subcutaneous performance of which, together with the difference in the danger of open and closed fractures, long before the day of Lister, should have pointed out the road to antiseptic surgery); and

Trephining, which, though formerly very frequent, had almost fallen into desuetude. South says in 1847, "the less done as regards fractures of the skull the better. They should never be interfered with except compression be present." The barbarous *écraseur* and the equally barbarous Jarvis's adjuster, were then in frequent use.

Ovariectomy was more than looked at askance. In 1846, *Mütter*, in commending Liston (*Mütter's Liston*, p. 442) for protesting against ovariectomy says: "It is certainly hazarding but little to assert that in a very few years the measure will be assigned to the oblivion it so richly merits," and so late as 1862, the year that I graduated, I heard the then professor of obstetrics (Meigs) in the Jefferson College, in his last course of lectures, declare with a warmth which did more credit to his humanity than to his science, "that the men who go about the country ripping open women's bellies should be indicted for murder." The first ovariectomy in England was performed in 1836; the first in France in 1844; but for Europe ovariectomy "was not fully established as a surgical procedure until after 1858, when Wells took it up" (*Heath's Hunterian Oration*, 1897); and in this country, where it had originated in 1809, at about the same date when the brothers *Atlee* suffered, one may say even persecution, because of their adherence to their belief that ovariectomy was a justifiable operation. Now, a number of surgeons can each count more than one thousand ovariectomies, perhaps some even two thousand, with a mortality in

their later results as low as 3 per cent. In his first thousand ovariectomies, on the basis of the annuity tables of life insurance companies after deducting the years lost by the fatal cases, it was estimated that Sir Spencer Wells alone had added twenty thousand years of happy useful life. With our modern antiseptic methods it would be no exaggeration to say that a thousand similar cases today would add thirty or possibly even thirty-five thousand years of human life. What that means to the hundreds of homes, to the hundreds of husbands and thousands of children in those homes, who can say?

It is impossible in the time allotted me, to do more than make a very brief survey of the surgery of 1897, as contrasted with that of 1847, but even a hasty glance will give us some idea of how far we have gone on the road of progress.

One of the most striking departments in which progress has been made is in that of the nervous system. In this *Mitchell*, though not a surgeon, has suggested many surgical advances. I have already quoted South's dictum as to fractures of the skull—a dictum which is now violated with the happiest results by almost every surgeon in the land. In addition to this, a very large number of tumors of the brain have been successfully removed, tumors which before 1884 were considered as wholly outside the domain of surgery. To our English brethren, Godlee, Horsley and Macewen, above all others, is due the credit of establishing cerebral surgery on a firm basis of right principles and successful technique.

In abscess of the brain we have a lesion, which is still more amenable to treatment, and the number of recoveries now mounts even into the hundreds. We have recognized that these abscesses very frequently arise from chronic disease of the middle ear, and, thanks to the otologist, we can now, by proper treatment, in many cases do better than operate on these abscesses—we can prevent them. The papers of Arbuthnot Lane, Ballance and Macewen have taught

us that even so formidable a disease as thrombosis of the sinuses, especially of the sigmoid sinus, can be dealt with successfully. Even the ventricles of the brain have been successfully invaded, drained, packed with gauze and washed out from side to side.

Tumors of the spine, since Mr. Horsley's brilliant paper, in 1888, have been proved accessible to the modern surgeon. Though *Abbe's* division of the posterior nerve roots, in cases of intractable neuralgia, has not been followed by all the success we could wish, it has proved that the operation is a practicable one. While, in the words of the hymn, we have not yet "stretched every nerve," we have almost realized that pious exhortation. Section of nerves by accident or deliberately, in the removal of tumors, was formerly followed by permanent paralysis, but now nerve suture has rescued many a poor sufferer and restored the junction of the divided nerve, even after months of separation. Facial neuralgia, once the bane of the surgeon and the sufferer, has now been cured in a number of cases, not only by the removal of the rebellious nerve, but as was suggested by *Mears* in 1884 (*Trs. Amer. Surg. Assoc.*, 1884, p. 482-3), even the Gasserian ganglion itself has been removed in more than a hundred cases. In this department the names of our American brethren, *Carnochan*, *Pancoast* and *Hartley* stand preëminent.

In disease of the organs of locomotion—the bones and the muscles—the expansion of modern surgical technique has been very marked. The plastic surgery of the bones seems scarcely to have any limit. Osteotomy is so safe that in 1884 *Macewen* reported 1,267 operations, on 704 patients, with only 5 deaths, and they were chiefly due to other causes than the operation. Tenotomy and transplantation of tendons have assumed a new field of usefulness undreamed of a few years ago. In fractures and dislocations the progress has been equally extraordinary. *Jarvis's* adjuster has given way to the method of manipulation first introduced by *Reid*, and reduced to a science by

*Bigelow* and *Allis*, for the hip, and *Kocher*, for the shoulder, and in a combination of fracture with dislocation, the ingenious hook of *McBurney* has enabled the surgeon, in many cases, to accomplish that which manipulation alone could not have done. The splints of *Nathan R. Smith* and *Hodgen*, and the introduction of adhesive plaster by *Gross*, and the subsequent application by this means of the weight and pulley by *Buck*, have supplanted the clumsy splint of *Desault*. Even so simple a means of treatment as that by plaster of Paris, together with the thorough disinfection of compound fractures, has enabled us to obtain results, either by the recumbent or the ambulatory treatment, which, but a few years ago, were impossible. Compound fractures, then among the most serious accidents of the human frame, with a mortality of about two out of every three, have so lost all their dangers that the mortality is hardly more than two out of every hundred.

Tumors, once too formidable either by reason of their size, their location, their adhesions, or the hemorrhage which attended their removal, have been made wholly amenable to treatment. We have been taught largely by the labors of the younger *Gross* and *Halsted* that even cancer no longer necessarily entails death by recurrence, but that if we remove the growth early and thoroughly, we can obtain a cure, which in the hands of Mr. Cheyne (*Lancet*, 1896, 1, p. 397) has recently reached the extraordinary result of 57 per cent. of *permanent cure* in cancer of the breast.

Not only has the exterior of the chest been invaded, but the ribs and the sternum are now resected, and when necessary the entire chest wall, over a large area, is removed with impunity.

Few of us, excepting the older living members of the profession, can remember the immense advance which paracentesis of the chest made, by reason of the persistent and fruitful researches of *Bowditch* and *Wyman*, about 1850, out of which have grown *Estlander's* and *Schede's* heroic and successful opera-



tions. Not only have accumulations within the pleura been evacuated, but *Roberts* was among the pioneers in the operation of paracentesis pericardii, while the surgery of the lung is now only taking its first tentative steps. The pericardium has also been sutured, and even the heart itself has twice been sutured, with one complete recovery (*Farina, Rev. de Chir.*, 1897, 335—*Rehn, Lancet*, 1897, 1, 1306).

We were taught by the younger *Gross* that the great veins could be successfully tied, and recently they have been successfully sutured—even the lateral sinus. The recent researches of *Abbe* (*N. Y. Med. Rec.*, Jan. 13, 1894, 39), and *Murphy* (*N. Y. Med. Rec.*, Jan. 16, 1897, 73), may open a new chapter in the surgery of the arteries by substituting suture with preservation of their lumen for occlusion by the ligature.

Quite as fruitful has been the surgery of the digestive tract. Foreign bodies in the esophagus which were very inefficiently dealt with fifty years ago, thanks to the Roentgen rays and modern surgical methods, are now in the large majority of cases successfully removed. In non-malignant stricture of the esophagus, *Abbe's* bowstring method has been a credit to American surgery.

I can do scarcely more than allude to the surgery of the stomach; to the value of gastroenterostomy, to pylorectomy, to pyloroplasty, to dilated stomach in which a tuck has been taken both by European and American surgeons, or hour-glass contraction of the stomach, which *Weir* and *Watson* have successfully remedied by operative procedures, to gastrotomy in stricture of the esophagus or *Richardson's* gastrotomy for the extraction of foreign bodies in the esophagus. In the surgery of the entire intestinal tract, America, it can be safely said, has led the world. To no one laborer in this field is more credit due than to the distinguished President of the AMERICAN MEDICAL ASSOCIATION (*Senn*), to whose irrepressible labor, genius and skill we owe most of our means and



methods of dealing with such diseases. He first showed us the most successful methods of making intestinal anastomosis, from which have arisen all of our modern methods of treatment of cancer of the large and small intestines, and many allied conditions. From these fruitful labors also have arisen our modern methods of the treatment of intestinal and fecal fistulæ, even in some cases reaching so far as the total exclusion of a considerable portion of the bowel. The modern, wonderfully successful treatment of wounds, whether stab wounds, gunshot wounds or others of the stomach, intestine or bladder, owe their success largely to the labors of the elder *Gross*, *Parkes*, *Senn*, *Bull*, *Murphy* and other Americans.

Cancer of the rectum, which, until about ten years ago, was almost inoperable, has now taken its place among the formal and justifiable operations of modern surgery, so that as much as twelve inches of the rectum have been resected by Kraske's method. The mortality has been reduced to 20 per cent., and permanent cure of such a formerly fatal disease has been attained in over one-third of the cases which recovered. (*Therap. Gaz.*, April and May, 1897.)

The other accessory organs in the abdomen have been conquered by the modern surgeon. Fifty-seven tumors of the liver have been removed with a mortality as low as 13.5 per cent. (Transactions Pennsylvania State Med. Soc., 1897.) The world owes to America the operation of cholecystotomy, since it was first done by *Bobbs* in 1867, and was popularized by the powerful influence of *Sims* in 1870. Pancreatic cysts, chiefly through the labors of *Senn*, are now amenable to treatment, while the spleen has been extirpated many times.

The appendix, that meagre but most troublesome ancestral vestige, which with the bicycle has been the faithful friend of the surgeon through the past few years of commercial depression, has been recognized within the last few years as the real origin of the so frequent abscess in the right iliac fossa. Beginning

with *Willard Parker's* paper, in 1867 (*N. Y. Med. Rec.*, 1867, ii, 25), and *Fitz's* memorable paper, in 1886 (*Trans. Assoc. Amer. Phys.*), the treatment of appendicitis, and even its much abused name, are distinctly of American origin, and an immense credit to American surgery.

Until Simon's classical experiments on dogs, in 1870 (*Deutsche Klinik*, xxii, 137) the kidney was a practically inaccessible organ, but now, when it wanders, we secure it by sutures; when there is a stone in it, we open it fearlessly and remove the stone; when it is distended with pus or urine we drain it, and if it is past hope of recovery we extirpate it, all with most remarkable success. Even stones in a ureter or a divided ureter, *Cabot*, *Fenger*, *Kelly* and *Van Hook* have shown us, can be successfully dealt with.

The treatment of stone in the bladder has undergone an extraordinary revolution since the introduction of *Bigelow's* litholapaxy. Its introduction as a surgical procedure was dependent on the prior researches of *Otis* and other Americans, who showed us that the caliber of the urethra was much greater than we had supposed, and permitted, therefore, the introduction of instruments of much larger diameter than before had been deemed allowable. The reintroduction of supra-pubic cystotomy, due largely to *Dulles's* paper, in 1875 (*Am. Jour. Med. Sci.*, lxx, 39), has permitted us to deal not only with large stones, but also with ulcers and tumors of the bladder; even large portions of the wall of the bladder have been removed successfully. The enlarged prostate is now, though always a serious danger, far less a menace to comfort and life since the introduction of *McGill's* and other methods of prostatectomy, and of *White's* operation of orchidectomy or the resection of the vas deferens.

The surgery of the pelvic organs has, one may say, been created since 1847, but its triumphs are so many that time allows only a word. *Sims's* treatment of vesico-vaginal fistula and his introduction of silver

wire in 1852 was distinctly an American triumph, while the labors of the *Atlees*, *Kimball*, *Peasley*, *Goodell*, *Thomas*, *Emmett*, *Battey*, *Kelly*, household names to all of us, have made pelvic surgery so successful that the danger is that it may be overdone. Many an ovary or womb, in the words of the witty toast, "absent from the body but present in the spirit," would far better have been left in possession of their owner.

The radical cure of hernia has been the product of the last twenty years, and the operations of *Halsted*, *Bassini* and *Macewen*, not to mention the many others, have taken a permanent place in the practice of the profession within the last ten years.<sup>2</sup> When we can report, as *Coley* has recently done (*Annals of Surg.*, March, 1897, 270), 360 cases, with only one death and seven recurrences, or as *Degarmo* has reported at this very meeting, 250 cases unmarred by a single death, the question of the propriety of operating for the radical cure of hernia even in children, is settled once for all.

Goiter fifty years ago was simply allowed to run its course, since hemorrhage destroyed nearly all those operated on; but two years ago *Kocher* (*Beilage z. Centralbl. f. Chir.*, 1895, 66) reported a series of a thousand operations, with a mortality of but 1 per cent., in non-malignant cases.

Extirpation of the larynx for malignant growths has taken its place among the justifiable and formal operative procedures. Acute intestinal obstruction, whether from bands, volvulus, intussusception or other conditions, is now dealt with as it ought to be, surgically, and, if promptly done, with the happiest results.

A hasty and very imperfect review, such as has been above given of the improvements in surgery within the last fifty years, does much more than show

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<sup>2</sup> *Marcy* informs me that he published his first paper on the use of the buried suture in 1870, and in 1881 he insisted on restoring the obliquity of the inguinal canal and using tendon sutures.

us the adroitness, audacity and success, of the modern surgeon. That is the thing which strikes us most as surgeons, but we must regard all this progress also from the standpoint of the patient and the community, and see what it means. It means a prolongation of life by operations, which, while not without pain and suffering during recovery, have been robbed of all their primary terrors by anesthesia, and most of their subsequent pain and suffering and danger by antisepsis; it means that patients who in 1847 were hopelessly consigned to the grave after weeks and months of suffering, are now, in the vast majority of cases, rescued from death; it means that families formerly bereft of husband and wife, parent or child, and left to spend years of sorrow, of suffering and, in many cases, of poverty, because the breadwinners were taken away, have now restored to them, their loved ones, in health and strength and usefulness; it means that the hecatombs of a Cæsar, an Alexander, a Napoleon, are offset by the beneficent labors of a Morton, a Warren, a Lister, who are, and for all time will be, blessed by many a poor patient, who never heard of them, instead of being cursed as the destroyers of nations and of homes innumerable; it means that man's inhumanity to man shall be replaced by a scientific and Christian altruism, which sheds blessings and benefits on the whole human race, seeing in the patient, whether saint or sinner, only a human being who is suffering from accident or disease, whom it is the province of the surgeon, in imitation of Him who went about doing good, to restore to health and happiness. Even where life can not be prolonged, the agonies of death itself can be soothed by his gentle hand and his fruitful skill.

What the future has in store for us we can only dream. Two diametrically opposing tendencies are prominent in modern surgery; radical interference with disease so that there is now scarcely a single organ or portion of the body, not within our reach; yet on the other hand a remarkably conservative tendency



in cultivating remedial rather than radical surgery. Joints so diseased as once to require amputation, are now treated conservatively with the best results; ovaries, a portion of which can be preserved, are kept in the abdomen; kidneys once doomed to extirpation are now partially removed, and bones so destroyed that they formerly required amputation, are now excised and the limb preserved. Experiments upon animals have recently given us wholly new views of infection and of the origin of many diseases, and also the little knowledge that we yet have as to either natural or acquired immunity, and to a consequent orrhoterapy.

It is, I believe, on these lines that our more immediate future triumphs will be achieved. We have discovered the actual cause of tetanus, tuberculosis, erysipelas, suppuration, and a host of other diseases and conditions, of the cause of which we were wholly ignorant a few years ago. The causes of many other disorders, both medical and surgical, still remain hidden from our view. We know almost nothing of the origin of benign tumors, and are groping to discover the origin of cancer, sarcoma and other malignant growths. When we have discovered the cause, we are nearly half way, or at least a long way, on the road to the discovery of the cure, and I think it not unlikely that in 1947, your then orator will be able to point to the time, when a definite knowledge of the causes of these diseases was attained, and probably to a time when their cure was first instituted.

That will be a surgical Paradise, when we can lay aside the knife, and by means of suitable toxins or anti-toxins, drugs or other methods of treatment, control inflammation, arrest suppuration, stay the ravages of tuberculosis and syphilis, abort or disperse tumors, cure cancer, and it may be, so prolong human life that all of his then audience will die either of accident or of old age. Would that you and I could be alive in 1947 to join in the glorious surgical *Te Deum!*

